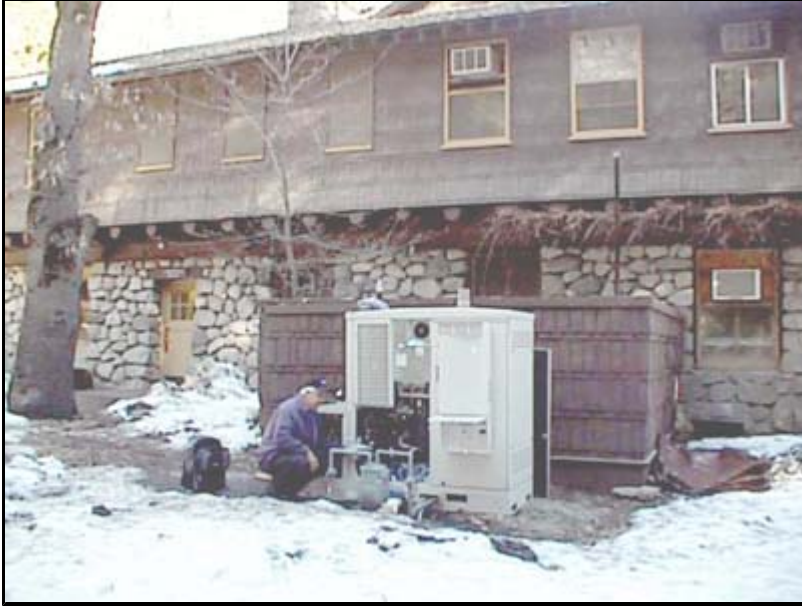


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## Fuel cell installed at Yosemite National Park



**This five-kilowatt fuel cell in Yosemite Village provides power to an Administration Building built in the 1920's. (Photo courtesy of CERL)**

**By Dana Finney  
Construction Engineering Research Laboratory**

The Construction Engineering Research Laboratory (CERL) has teamed with the National Park Service (NPS) to install a proton-exchange membrane (PEM) fuel cell at Yosemite National Park in California. The five-kilowatt plug power unit provides electricity to the Administration Building in Yosemite Village. Heat from the fuel cell also augments the building's diesel-fired boiler to provide hot water, and a set of plug-ins added to the circuit from the cell to the building allows the park to recharge its electric car fleet.

"The motivation to install a fuel cell was to demonstrate the usefulness of the technology for the unique power applications at Yosemite," said Kent Summers, electrician in the High Voltage Operations office. "We have several remote locations in the park where we need to supply electric power. Fuel cells are quieter and more environmentally friendly than their diesel counterparts."

The PEM fuel cell will help Yosemite meet the goals of the Green Energy Parks Program, a joint initiative between the Department of the Interior and Department of Energy. This program aims to promote the use of energy-efficient and renewable energy technologies and practices in U.S. National Parks, and to educate the visiting public about these efforts. The slogan is "Making the National Parks a Showcase for a Sustainable Energy Future."

Fuel cells are electrochemical power generators that can attain very high electrical energy conversion efficiencies while operating quietly with minimal polluting emissions. In addition, byproduct heat generated in the fuel cell is available to create hot water or steam, raising the overall potential conversion efficiency (electrical plus thermal) to about 85 percent. Fuel cells use hydrogen from different gaseous fuels to produce power, with Yosemite's fuel cell using propane for fuel source since natural gas is unavailable.

Modem-connected sensors give remote access to the park's electric operations staff to monitor performance and collect operating data.

"PEM fuel cells are intended for residential use," said Dr. Michael Binder, project manager at CERL. "They have Department of Defense interest as a clean and efficient source of power generation, and for their potential in distributed generation strategies including those developed for energy security."

CERL has managed the DoD Fuel Cell Demonstration Program since 1993. The program seeks to collect

performance data that can help manufacturers optimize the systems and make them affordable in a shorter timeframe than may otherwise be possible. Another goal is to explore the potential uses that could bring about economies of scale. The current PEM fuel cells cost about \$65,000 each.

According to Summers, Yosemite hopes to install a second fuel cell in the near future. "We're experimenting with them in accessible locations now to better understand how to use them in remote locations," he said. The park also hopes to obtain funding to set up a "Wayside Exhibit" to educate the public about all of the ongoing green energy efforts there, which include photovoltaic applications and electric cars in addition to the fuel cell.

Part of CERL's goal in the fuel cell program is to demonstrate the units in diverse climates and operating conditions to determine if these environments affect performance. Other factors that Binder's team document, in addition to system availability, is the fuel cell's ability to cut off from the main utility grid in the event of a power failure to provide emergency backup electricity and heat.

For more information on the fuel cell demonstration program, please contact Dr. Michael Binder at CERL, 217-373-7214, or m-binder@cecer.army.mil. Visit the DoD website at [www.dodfuelcell.com](http://www.dodfuelcell.com).

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